# TCW JIP Study Status Update: Summary of Preliminary 2019 TCW Discharge Sample Data and Next Steps

USEPA Region 4 and Region 6
January 28, 2020

# Presentation Purpose and Objectives

- The purpose of this presentation is to provide USEPA Region 4 and Region 6 with a Joint Industry Project (JIP) study status update.
- The objectives of this presentation are to:
  - Present an overview of preliminary 2019 results.
  - Summarize the types of TCW discharges sampled in 2019.
  - Present preliminary 48-hour (48-h) whole effluent toxicity (WET) test results.
  - Present the preliminary results of laboratory chemical analyses.
  - Review the selection of TCW discharge samples for 2020.

# Overview

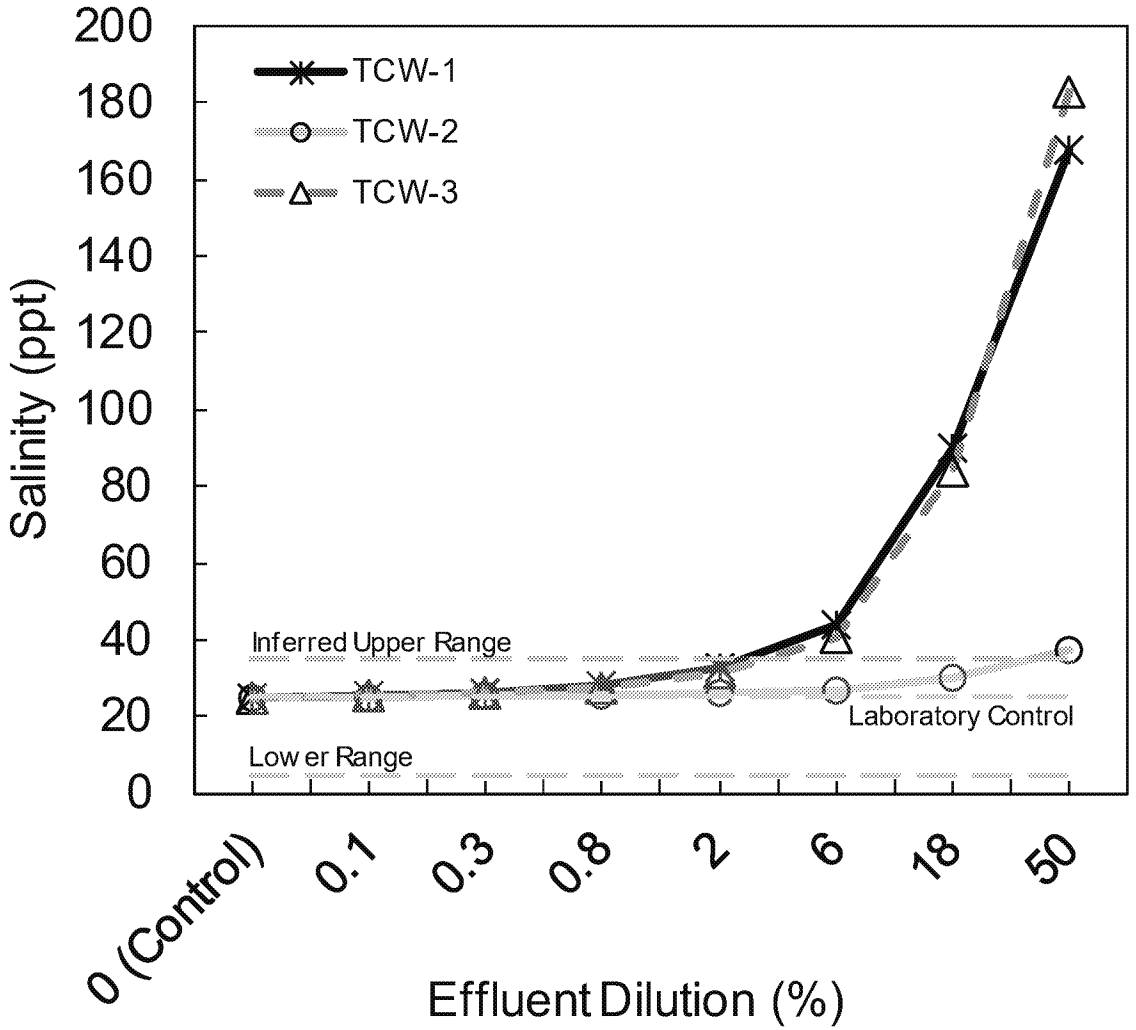
- Operators and vendors provided the information necessary to meet JIP study data quality objectives.
- Since USEPA approval of the JIP study plan, three Category I TCW discharge samples were collected for analysis in 2019. Discharge duration is short (range 0.5 to 1.5 hours).
- Samples were evaluated with acute, 48-h whole effluent toxicity (WET) and laboratory chemical testing. All WET test samples were collected within the laboratory holding time (36 hours).
- TCW samples are highly saline. WET test treatments from 50% to ≈3% effluent exhibit salinity concentrations greater than the biological range of the test organisms.
- Acute effects were bracketed by the selected WET test effluent dilution series.
- *Americamysis bahia* (Mysid) is more sensitive than *Menidia beryllina* (Inland silverside minnow).
- The chemical composition of TCW samples at effluent dilutions ranging from 0.4 to 0.5% was similar to laboratory diluent for the tested samples.
- Up to 20 TCW discharge samples could potentially be collected in 2020.

# General TCW Discharge Characteristics

| Characteristics | Sample | | |
|---|---|---|---|
| | TCW-1 | TCW-2 | TCW-3 |
| Sample Collection Date | 12/19/2019 | 11/8/2019 | 11/25/2019 |
| Type of Operation | Zonal Isolation | Completion | Workover |
| Type of TCW Fluid Used? | Category I brine; $CaCl_2$ 10.5 ppg | Category I brine; $CaBr_2$ 12.1 ppg | Category I brine; $CaCl_2$ 11.6 ppg |
| Are chemical additives used? | No | Yes | Yes |
| Depth from Discharge to Seafloor (meters) | 710 | 1,251 | 2,681 |
| Duration of Discharge (hr.) | 1.25 | 0.5 | 1.5 |
| Discharge Volume over Duration of Discharge (bbl) | 965 | 272 | 1,476 |
| Sample Salinity (100% Effluent) (ppt) | 358 | 57.8 | 354 |

Notes:
ppg; pounds per gallon
ppt; parts per thousand
bbl; barrel
hr.; hour

# Preliminary WET Data – Salinity of TCW Samples



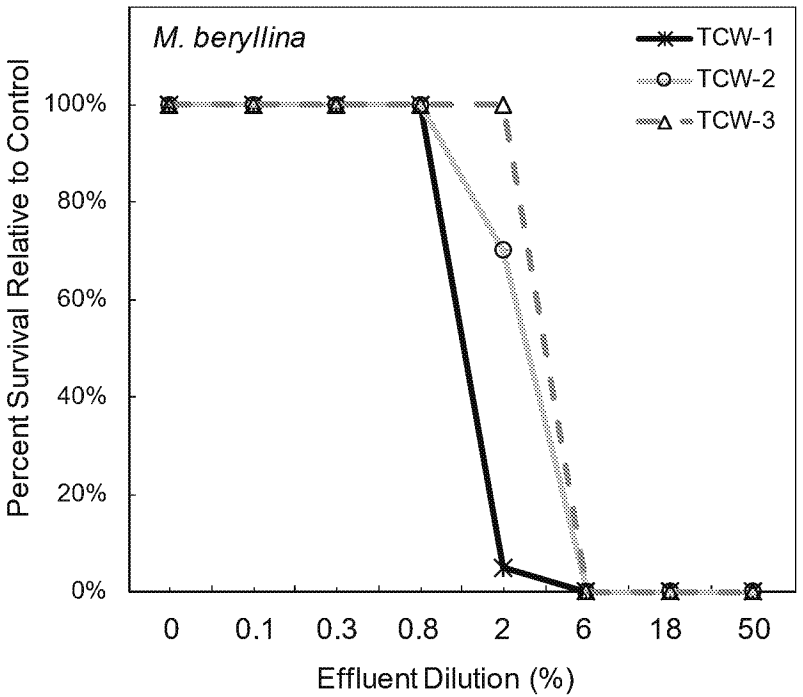

WET test treatments from 50% to ≈3% effluent exhibit salinity concentrations greater than the biological range of the test organisms.

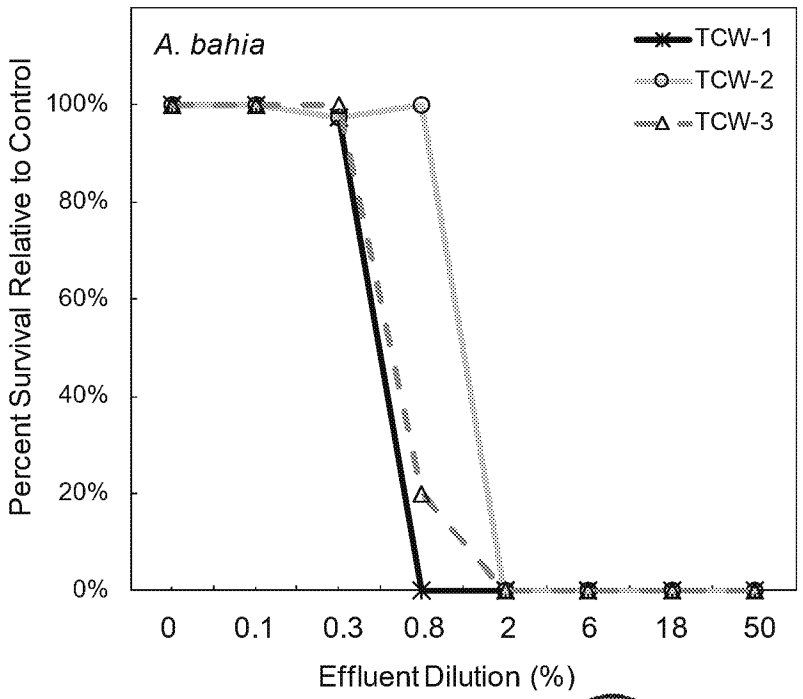
USEPA (2002) suggested salinity for culturing *A. bahia* is 25 ppt.

**Notes**: ppt; parts per thousand. Per USEPA (2002): 5-32ppt ±10% for *M. beryllina*; 5-30ppt ±10% for *A. bahia*.

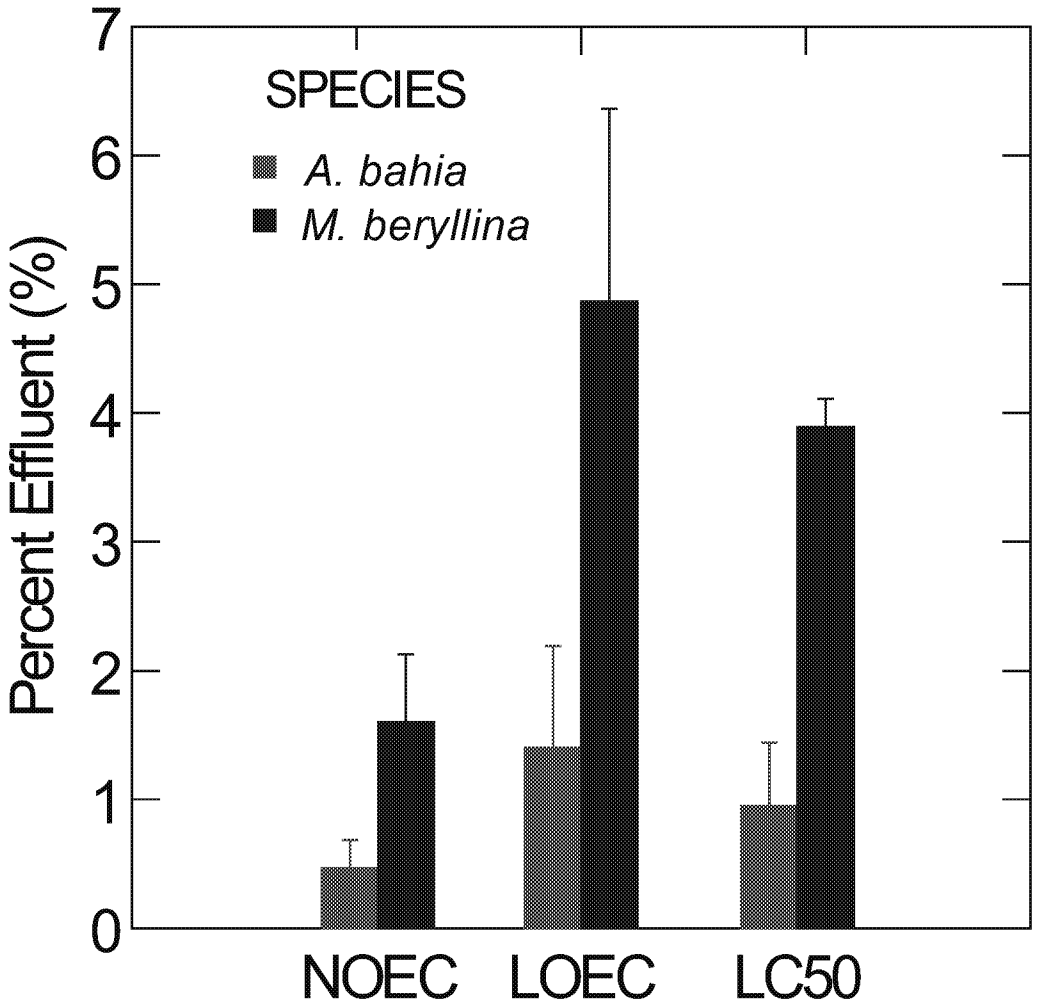
# Preliminary WET Data – 48-h Response Curves

- Acute effects were bracketed by the selected effluent dilution series.
- A statistically significant dose-response was observed. Some of the preliminary response curves exhibit an “all or nothing” response which is common in WET test data.
- The preliminary results and potential follow-up activities to characterize toxicity are being evaluated.



# Preliminary WET Data – 48-h Acute WET Test Endpoints

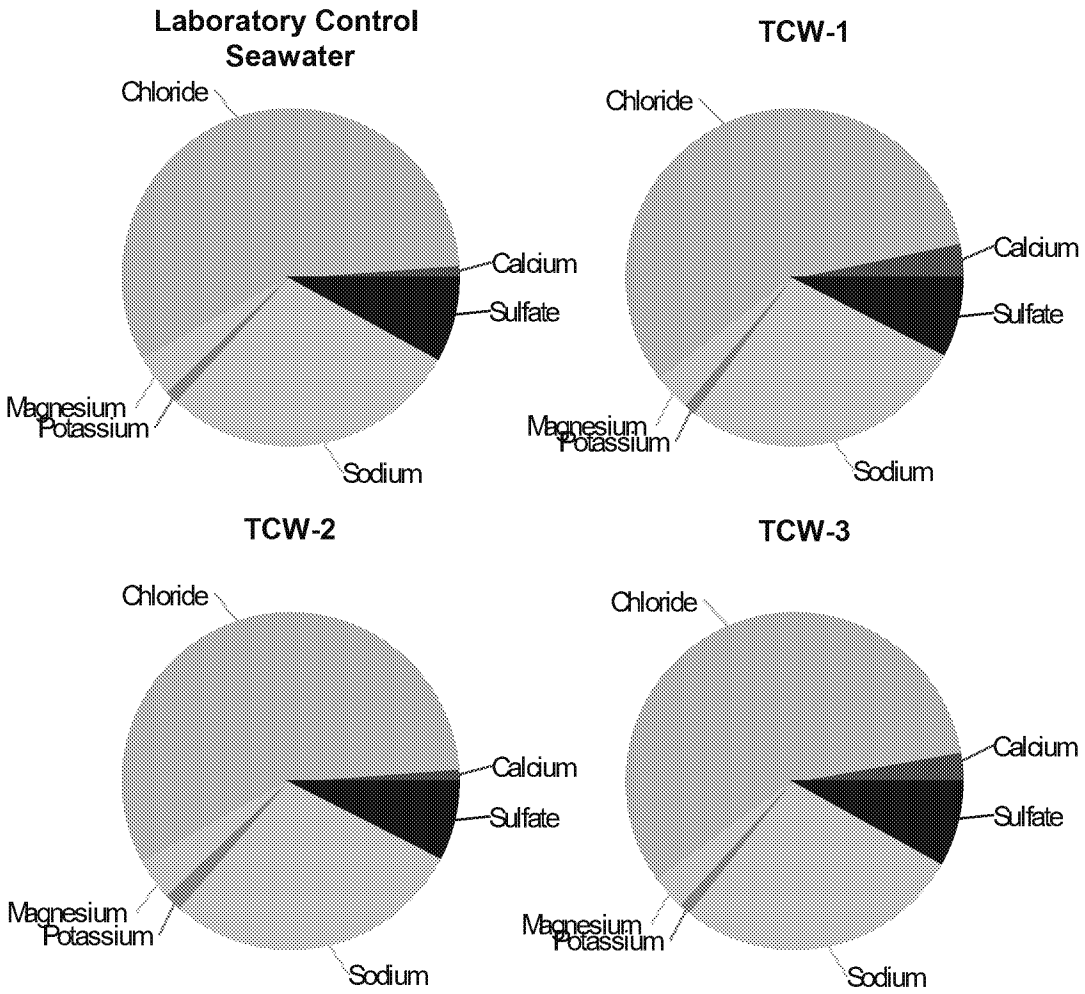



**Notes:**
Error bars represent ±1 standard error; n=3.

*A. bahia* (Mysid) is more sensitive than *M. beryllina* (Inland silverside minnow) in the WET tests performed.

# Preliminary Laboratory Analytical Data

- The chemical composition of TCW samples at effluent dilutions of 0.4 to 0.5% was similar to laboratory control seawater.
- **Detected above the laboratory reporting limit**: Most water quality parameters; total/dissolved metals; and cations/anions.
- **Not detected**: PAHs; ammonia; chemical oxygen demand; some total/dissolved metals.




Ionic composition

# Next Steps – 2020 TCW Discharge Sampling

- Up to 20 samples could potentially be collected in 2020. Representative samples for 2020 were randomly selected using the variables below:

| Input Variable Type | Input Variable | Discrete or Continuous Variable? | Rationale for Selection |
|---|---|---|---|
| Geographical | Block No. | Discrete | Spatial aspect; position within the study area. |
| | Water Column Depth | Continuous | |
| TCW Fluid Type | Category I | Discrete: Binary "No" = 0; "Yes" = 1 | Can influence whole effluent toxicity and chemical makeup. |
| | Category II | | |
| | Category III | | |
| | Category IV | | |
| | Other | | |
| Chemical Additives | Corrosion Inhibitors | | |
| | De-emulsifiers | | |
| | Surfactants | | |
| | Defoamers | | |
| | Biocides | | |
| Discharge Treatment | No Treatment or Tank Storage | | |
| | Tank Storage | | |
| | Filtration | | |
| | Other Treatment | | |

- OOC plans to discuss the study sampling schedule timeframe with USEPA in April to determine the appropriate time to cease sample collection activities.


Discussion